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Examining a Silicon Valley Health IT Cluster:
A Study in Economic Development and Workforce Development

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The NOVA (North Valley) Workforce Investment Board is a nonprofit, federally-funded employment and training agency that provides customer-focused workforce development services for northern Santa Clara County, including the cities of: Cupertino, Mountain View, Los Altos, Milpitas, Santa Clara, Palo Alto, and Sunnyvale. We work closely with local businesses, educators, and job seekers to ensure that our programs provide opportunities that build the knowledge, skills, and attitudes necessary to address the workforce needs of Silicon Valley.

NOVA's purpose is to support workforce mobility by easing workers' transitions to new opportunities throughout their career cycles. To advance transitions with economic sustainability, NOVA provides: real-time labor market information about in-demand skills; skill-building and enhancements to match market demand; navigation tools for the ever- changing and entrepreneurial new labor market; advocacy for necessary infrastructure to support workers between opportunities, such as unemployment insurance for all and portable benefits; and interconnected support system for multiple career pathways for youth.

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work2future is the Local Workforce Investment Board administering the Federal Workforce Investment Act of 1998 for the cities of Campbell, Gilroy, Los Altos Hills, Los Gatos, Monte Sereno, Morgan Hill, San Jose and Saratoga. It also serves the unincorporated areas of Santa Clara County. work2future addresses the workforce and economic development needs of these communities in collaboration with small and large businesses, educational institutions and community-based organizations.

It is strategically positioned within the City of San José Office of Economic Development and provides One-Stop Centers in San Jose, Campbell, Morgan Hill and Gilroy. work2future One-Stop Centers offer services and resources that help job seekers obtain the skills and training they need to find employment, assist businesses in meeting their workforce and business development needs, and enable youth to jump-start their careers with skills training and job-search assistance.

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Introduction

In 2010, the State of California Workforce Investment Board awarded a Regional Industry Cluster Opportunity (RICO) Grant to two Silicon Valley workforce investment boards—NOVA and work2future—to explore a potential Health IT regional cluster opportunity in Santa Clara and San Mateo Counties (herein Silicon Valley). This Silicon Valley Team conducted an analysis of the potential cluster, searching for growth in cluster-related value, jobs or wages.

Silicon Valley, like much of the nation, has been party to a steep increase in discussion about Health Information Technology (IT)-related importance, changes in technologies, and general *buzz*. The Silicon Valley's innate IT innovation climate and strong healthcare sector suggested a potential evolution of a natural cluster at the intersection of these industries—Health IT. An examination of regional industry clusters of opportunity offered Silicon Valley the prospect of testing the buzz on Health IT.

The Silicon Valley Team recruited a group of key stakeholders to inform the process and make recommendations as detailed in this report. The team designed a continuum of qualitative and quantitative activities to gather labor market data and anecdotal knowledge; all information collected helped inform the work of the stakeholders.

The report includes the following:

1. Overview of Silicon Valley Information Technology & Healthcare Industries
2. Description of Silicon Valley's RICO Process
3. Exploration of the Silicon Valley Health IT Landscape
4. Detailed Cluster Findings
5. Recommendations and Action Plan

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The plan and identified strategies will be implemented through a process of collaboration and at the right time for the emerging Silicon Valley Health IT cluster. Further, Silicon Valley WIBs will continue to work within the healthcare and IT sectors to uncover buzz, future opportunities, and to move this work forward.

I: Silicon Valley Information Technology and Healthcare Industries

Over seventy years ago, two Stanford University-trained engineers formed a partnership and began producing resistance-capacitance audio oscillators in a small Palo Alto garage at 367 Addison Avenue. With that first product, William Hewlett and David Packard launched the Hewlett-Packard Company; more importantly, they sparked a culture of innovation in Silicon Valley that remains to this day.

Fueled by an entrepreneurial spirit, a highly skilled workforce, and strong universities like Stanford, Santa Clara and San José State, Santa Clara and San Mateo Counties have become world renowned as the nation's epicenter for high-tech—known as "Silicon Valley." Leading companies here include IBM, Hewlett-Packard, Apple, eBay, Intel, Genentech, Cisco Systems and Google.

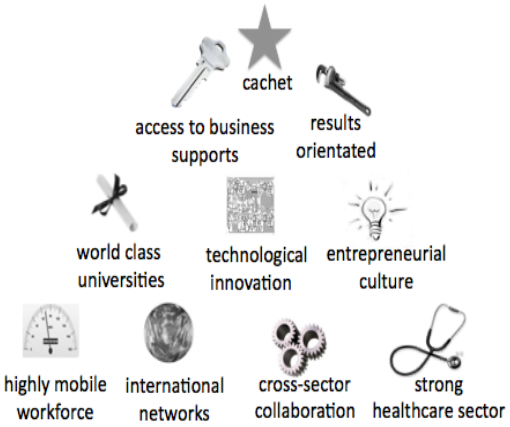
Silicon Valley's success is also measured in terms of the amount of venture capital invested, as well as the number of patents awarded in the area. In a given year, companies in the San Francisco Bay Area—particularly in Silicon Valley—receive over one-third of the total U.S. venture capital spending. This figure appears to be rising, and reached 40% in the fourth quarter of 2010 according to PricewaterhouseCoopers, which tracks investments in their *MoneyTree Report*.

The region is also considered the nation's most innovative area, generating over 10,000 U.S. patents in 2009, more than half of the patents produced in California (US Patent and Trademark Office). The area's drive for innovation couples well with rigorous U.S. intellectual property laws that allow U.S.-based international companies to maintain control over particularly sensitive elements of their designs. In fact, so many patents are generated here that David Kappos, Director of the United States Patent and Trademark Office, announced during Joint Venture's March 2011 regional collaborative meeting that the Patent Office is considering opening a regional office to handle the volume. Moreover, many Santa Clara County jobs focus on creation: manufacturing; information services; and professional, technical and scientific services account for 35 percent of regional jobs, as compared with the nation's 18 percent.

Silicon Valley, an area once known as an agricultural center, now grows entrepreneurs and produces astounding innovations in Information Technology (IT). There are specific factors that have made Silicon Valley a successful habitat for such entrepreneurship and innovation (*Silicon Valley Edge*, 2000). These factors include the following:

- Easy access to venture capital and other specialized business supports for innovation (e.g. intellectual property lawyers, talent recruiters)
- Large amount of new information technology ideas from entrepreneurs,

universities and labs
- High-quality and mobile workforce with networks reaching all over the world
- Results-oriented environment where talent and ideas rule (regardless of national origin)
- Attractive living environment
- Cultural norms of calculated risk-taking and an optimistic entrepreneurial spirit
- Open business environment—commonly sharing non-privileged information
- Cross-sector collaboration



With its distinctive culture, environment, and asset base, Silicon Valley has become known as the word's center for innovation and entrepreneurship, producing ideas, inventions and industries that have changed the world.

Although renowned for technical innovation, the Silicon Valley IT sector recently faced a heavy downturn as a result of the 2009 recession. At the same time, healthcare was the one major industry sector that consistently demonstrated employment growth nationwide—a steady 2% to 4% in previous years—even as other sectors showed employment declines in double digit levels.

The Bureau of Labor Statistics states that nationwide, the healthcare sector is one of the largest, providing 14.3 million jobs in 2008. Between The industry will will generate 3.2 million new wage and salary jobs between 2008 and 2018. It has shown steady gains both locally and nationally, largely in response to an aging population. Two San Francisco Bay Area institutions are integral to the regional healthcare industry's vitality: Kaiser Permanente and Stanford Hospital and Clinics (and affiliated University Medical School). These two organizations are renowned leaders in their field for innovation and research, in addition to direct patient care. They exist at the epicenter of a robust and highly competitive healthcare sector that includes the Catholic Healthcare West system, the Sutter Health Network, the Washington Hospital Healthcare System, the two county systems (Santa Clara Valley Medical Center and San Mateo County Medical Center), the Veterans Affairs Healthcare System, Planned Parenthood Mar Monte, San Jose Regional Medical Center, and the El Camino Hospital System, in addition to community clinics, Federally Qualified Health Centers, private providers, small family practices, and long-term and assisted-living centers.

Kaiser Permanente is the leading nonprofit integrated health plan in the United

States, serving more than 8.6 million people in nine states and the District of Columbia. Headquartered in the San Francisco Bay Area, nearly 40% of all Californians have a Kaiser health plan. Nationwide, Kaiser Permanente Health IT systems manage more data than is housed by the Library of Congress. The organization tests and operationalizes advancements in clinical workflow improvement and integration at the San Leandro Garfield Innovation Center. The organization has been honored with awards for innovation by the Centers for Disease Control, Alliance for Quality Health Care, IDG's CIO magazine, and the Center for Business Intelligence, among others, for patient medication adherence, workplace innovation, information technology, and multi-cultural healthcare. Kaiser has become a national pioneer for workplace and process excellence.

"Most places of higher learning look down their noses at people who want to start businesses. That is not true with Stanford...Stanford has a great history of allowing entrepreneurship to go hand-in-hand with academics. I think that it's the principal reason why Silicon Valley is so successful." Jim Clark, co-founder of Silicon Graphics and Netscape at SDForum 2009 Visionary Awards

Stanford Hospital is the top-ranked hospital district in Silicon Valley, as reported by 2012 *U.S. News and World Reports*, with academic and professional networks that span the globe. It is closely affiliated with Stanford Medical School, ranked 5th in the nation by the same report. True to Stanford University tradition, the hospital interacts heavily with private industry. In May 2011, HP announced that it would partner with Stanford's Lucille Packard Children's Hospital. The company will donate $25 million, $4 million of which will be dedicated to a synergistic research effort—using IT to improve treatment protocols and safety procedures—by scientists at the hospital and at the company's central research division, HP Labs. In February 2011 Stanford announced the Corporate Partners Program, whose contributions are projected to provide up to $150 million over the next 10 years, to help build a new hospital (Stanford Medical Center) and create a global model for patient-centered, technologically advanced healthcare. The founding members are Apple, eBay, HP, Intel, Intuit and Oracle—six leading Silicon Valley technology companies.

The combination of Silicon Valley's innovation climate with the anticipated growth of the healthcare industry and the region's strengths in information technology, suggests the likelihood of the evolution of a natural cluster at the intersection of these industries to address and inform ever evolving changes in Health Information Technology.

II: Silicon Valley's RICO Process

Overview

The State of California supported exploration of local clusters of opportunity to drive regional economic competitiveness statewide through a Regional Industry Cluster of Opportunity Grant (RICO). Silicon Valley (represented by three Silicon Valley workforce investment boards covering all of Santa Clara and San Mateo Counties and lead by NOVA and work2future) was awarded a RICO planning grant to examine a potential Health Information Technology cluster existing between innate Information Technology and Healthcare sectors.

The regional cluster approach has attracted growing interest among both academics and government bodies during the last few decades to design regional development policies adapted to the local economy's needs. A cluster differs from an industry sector. An industry sector is a group of firms with similar business process, products, or services. The cluster concept broadens the understanding of business development to reflect that socio-economic conditions and non-firms (non-core industry) play an important role in business outcomes. The cluster horizon broadens to consider the interrelationships between industry, academia, and government.

Clusters of opportunity: "sectors of the economy identified by growth in one or more areas: value, jobs, or wages"

Herein, a cluster is a combination of multiple sectors—with a particular industry or specialization at its core driving cooperation and competition—and geographically concentrated. Physical proximity is a key feature for effective collaboration; thus it is key for the learning and innovation processes developed by a cluster.

Approach

The Silicon Valley RICO team investigated a potential Health Information Technology (Health IT) regional cluster opportunity at the intersection of the two industries—healthcare and IT. The team designed a continuum of activities of gathering labor market data and anecdotal knowledge to help inform the work of the stakeholders. Goals included the following:

- Exploration and clarification of cluster issues
- Identification of key strategies, outcomes and partners
- Facilitation of connections between the workforce participants and industry cluster representatives in an effort to align the resources of educators and workforce investment boards (supply side) with the needs of employers (demand side)

This planning grant combined quantitative and qualitative data gathering

methods to execute the aforementioned goals. Methods were selected to facilitate the definition and identification of cluster opportunities and the comprehension of the workforce and economic development requirements needed for the cluster. Research efforts entailed the following:

- Consultation of Health IT background and secondary literature review
- Direct survey of Silicon Valley 200 healthcare employers (NOVA study)
- Key informant interviews with employers in healthcare, focusing on Health IT
- Both informal and semi-structured interviews and meetings with healthcare, educational, information technology, non-profit and government partners
- Referral requests by asking all key informants for other contacts to help build the cluster value chain and develop stakeholders
- Consultation meetings and workshops with stakeholders
- Continuous evaluation and re-evaluation of cluster data definitions

The Silicon Valley RICO Team leveraged American Recovery and Reinvestment Act (ARRA) funds for the initial study of the healthcare workforce and Health IT implications. Peninsula Works WIB, a partner in this process, also used ARRA funds for a recently completed assessment of healthcare and Health IT workforce for San Mateo County. Other efforts in research and study into the Health IT sector informed this endeavor. This included work completed by California Community Colleges in the San Francisco Bay Area and a RICO colleague, San Diego Workforce Partnership. Additionally, NOVA's ARRA funds, used to examine the Information Communication Technology sector, influenced findings, particularly around entrepreneurial activity at points of intersection between ICT and Health IT. The total amount of funding leveraged exceeded $500,000.

Emerging Intersections of IT and Healthcare

Initial data (CA EDD, 2008) indicated the potential strength of the sector based on numbers: of the 25 largest Santa Clara County employers, 12 had IT functions or products and separately, 16 had healthcare or health related functions or products. Further fundamentals were provided by Joint Venture's 2008 health and IT sector analysis (*Smart Valley and Smart Health*[1]) complemented with NOVA Workforce Investment Board's *2010 Healthcare Workforce Study.* Work2Future's geographic information systems (GIS) EconoVue program allowed further understanding of the physical landscape of where companies were and where they were not.

Connections with industry allowed for an expansion beyond the initial research to evaluate the cluster and cluster opportunities. Formal and informal discussions with employers on a local and national level include the following (meeting

[1] *Smart Valley and Smart Health* targeted understanding barriers inherent in applying information technology to healthcare and to develop solutions that would make a difference regionally and beyond

overviews are detailed in Appendix C):

- Healthcare Information and Management Systems Society (HIMSS) events
- State of California planning meetings and webinars around Health Information Exchange and Technology (including local Regional Extension Centers and Cal-eConnect, California's Health Information Exchange convener)
- Group collaborative interested in exploring Health and IT intersections
- On-site tour of the Kaiser Garfield Innovation Center to better understand how innovation is spread across a large (and locally based) health system

These conversations allowed for both gathering data and outreaching to participants to join in the planning process. During the three stakeholders' forums (detailed attendee list included in Appendix B)—and during subsequent discussions with employers—participants identified and agreed upon opportunities for cluster growth, as well as the economic and workforce requirements to capitalize on those growth opportunities.

The Silicon Valley Team's findings and conclusions, detailed later in the report, flowed from information gathered during these touchpoints.

III: Exploring the Silicon Valley Health IT Landscape

Health IT from a National Perspective

There are two major pieces of federal legislation that drove and continue to drive changes around technical and IT requirements for the healthcare industry and workforce. The first is the 2009 passing of the Health Information Technology for Economic and Clinical Health Act (HITECH Act), enacted as part of the American Recovery and Reinvestment Act. The second is the 2010 healthcare reform package, consisting of the Patient Protection and Affordable Care Act (ACA) and the Health Care and Education Reconciliation Act of 2010. Healthcare reform will increase access to healthcare to millions of Americans and HITECH policies will enable Healthcare Reform goals to be achieved through attempts at increasing healthcare efficiencies and lowering costs via IT.

HITECH, and its Federal Health IT (FHIT) Agenda currently in draft form, is the strongest driver for Health IT changes. FHITA has five strategic goals, with a chronological implementation order (2011–2015):

1. ***Achieve Adoption and Information Exchange through Meaningful Use (MU) of Health IT***

As the centerpiece of the government's Health IT strategy for the next five years, MU initially focuses on widespread adoption and health information exchange (HIE), eventually to build improved health outcomes in the final stages.

2. ***Improve Care, Improve Population Health, & Reduce Healthcare Costs through Health IT Use***

This details the specific ways Health IT contributes to the goals of healthcare reform via improved care and population health and reduced per capita healthcare costs. Required activities include the widespread adoption of electronic health information records (EHRs), HIE, quality improvement initiatives, and healthcare reform pilots.

3. ***Inspire Confidence and Trust in Health IT***

This is the government's efforts to update privacy and security approaches related to Health IT in order to build greater confidence and trust in EHRs and HIE among providers and the public.

4. ***Empower Individuals with Health IT to Improve their Health and the Health Care System***

This demonstrates how the government is designing Health IT policies and programs to meet individual needs and expectations, providing individuals with access to their health information, helping to facilitate a strong consumer Health IT market, and better integrating patient and clinician communications through Health IT.

5. ***Achieve Rapid Learning and Technological Advancement***

The long-term aim is to develop a "learning health system" whereby a vast array of healthcare data can be appropriately aggregated, analyzed, and leveraged in real-time using algorithms and functions. This goal demonstrates ways in which

Health IT and MU can enable innovation and appropriate use of health information to improve knowledge about healthcare across populations.

The federal government heavily incentivizes the first FHIT Agenda goal (Adoption and Information Exchange) for all healthcare practitioners and hospitals through the Centers for Medicare and Medicaid Services (CMS) reimbursements. For example, beginning in 2011, California's Medi-Cal will offer up to a total of $1 billion in incentive payments to eligible California providers that adopt, implement and upgrade electronic health records and achieve meaningful use by health information exchange. Therefore, the majority of current Health IT activity centers on capturing these monetary incentives. IT firms capitalizing on these opportunities focus on electronic health and medical records (EHR/EMR) and the exchange of health information (HIE) through these systems. As referenced in Table 1, vendors with these foci are all east of the Mississippi River, principally in the Midwest and on the East Coast.

Table 1. Top Vendors of Acute-Care EHR Systems per Number of Installations (2009)

Company	Location	Installations (%)
*Meditech	Westwood, MA	26.6
McKesson Provider Tech	Alpharetta, GA	14.1
*Cerner	Kansas City, MO	12.6
Siemens Medical	Malvern, PA	9.5
Self-developed	- (own site)	8.0
CPSI	Mobile, AL	7.9
*Epic Systems	Madison, WI	6.0
Eclipsys	Boca Raton, FL	5.5
Healthcare Mgmt Systems	Nashville, TN	5.3
Healthland	Glenwood, MN	3.8

*Source: HIMSS Analytics Database (h/t Modern Healthcare) Data reflects EHR installations at 4,454 U.S. acute-care hospitals. *Companies with highest market saturation*

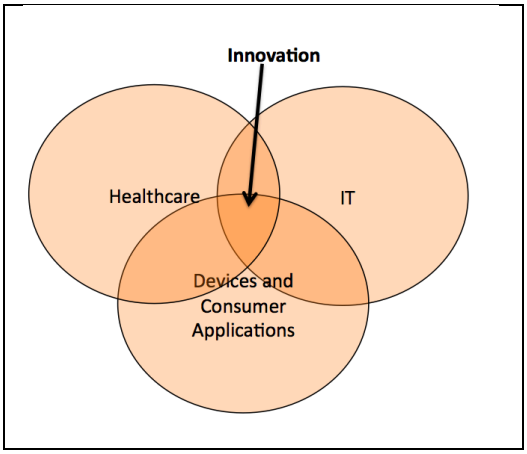
Vendors' scramble to position themselves for Health IT stimulus funds has spawned demand for some hard-to-find skills. They are responsible for many of the 40,000 new Health IT jobs that Dr. David Blumenthal, National Health IT Coordinator, reported during his keynote speech at the 2010 HIMSS conference (*Information Week*, 2010). Accordingly, many of these positions will be located at companies east of the Mississippi River, and many will be contract positions used to fill gaps as healthcare staff comes up to speed with newly needed skills.

Further competing for attention, CMS requires that healthcare providers switch from ICD-9—a classification system of assigning codes to diagnoses associated with healthcare transactions—to the much more complex ICD-10 by October 2013, with severe financial repercussions for noncompliance. There will be an explosion of classifications (codes), from ICD-9's 15,000 to ICD-10's 110,000. Providers will focus on updating existing clinical documentation and IT systems

as well as training incumbent staff for skill enhancements, including better knowledge of anatomy and physiology and new classifications.

> "Why is Lockheed Martin interested in healthcare? To paraphrase Robert Gates (22nd Secretary of Defense) healthcare costs are the biggest threat to national security. It's an economic security issue." Richard Boyd, Chief Architect for Virtual World Labs at Lockheed Martin

As the FHIT Agenda progresses through its goals to bring IT to healthcare, it will transform the very landscape of healthcare; new IT-interrelated economic and workforce opportunities will follow. The healthcare industry is not known for collaboration or for thrift. In part this is because of the very sensitive nature of data that the industry guards and in part because of complicated systems of payer relationships, lack of coordination, and defensive actions to prevent malpractice lawsuits. Yet, achieving the national mandate will require collaboration with multiple specialties in healthcare, IT, and other industries, even more so as patients develop more of a client relationship in the healthcare setting. The FHIT Agenda demonstrates the core importance of facilitating a strong consumer Health IT market while controlling costs; the majority of the costs controlled would be through data driven-care decisions and practices enabled by information technology and business intelligence applications.



Additionally, standards around product classification (software versus medical device), interoperability and protocols are currently undecided. This is in stark contrast to internet standards. The internet has a ubiquitous network protocol and widespread availability of higher-level protocols, like HTTP, that are supported on every operating system, even mobile phones. Although the Office of the National Health IT Coordinator offers some guidance, by defining Meaningful Use, the answer regarding how to regulate Health IT products and solutions, in order to facilitate easy exchange of data bytes, is as of yet unclear. Answers to these questions and progression to the later stage FHIT Agenda goals will open up Health IT to other regional areas of expertise, beyond electronic medical records, and will allow for true innovation.

> "Standards are like toothbrushes—everybody agrees you should have one, but no one wants to use yours." HIMSS11

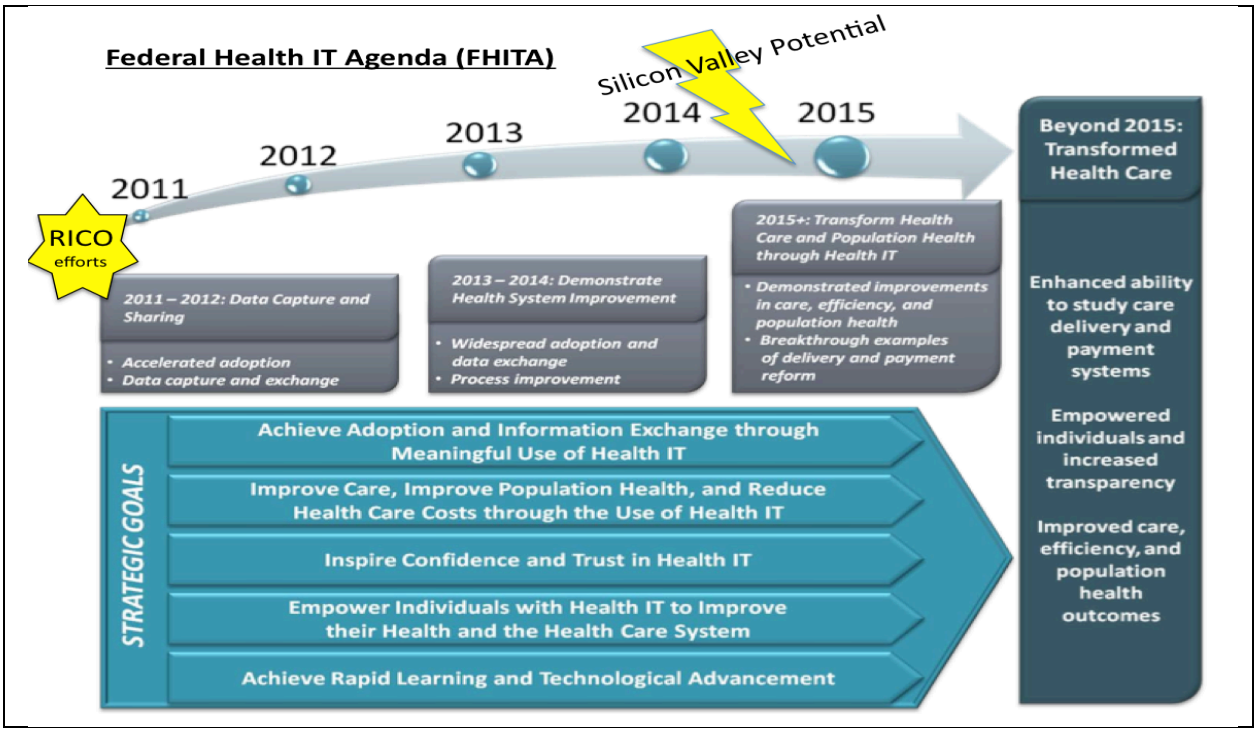
Health IT from a Silicon Valley Perspective

As recent as 2005, Joint Venture convened a task force of representatives of three major Silicon Valley healthcare stakeholder groups—healthcare providers, employers and insurers—to try to understand barriers inherent in applying information technology to healthcare and to develop solutions that would make a difference regionally and beyond. After two years of exploration, Joint Venture concluded that although individual stakeholders were progressing towards development of information technology solutions within their own organizations, there was no universal agreement among the providers that medical records (and health information) should be shared electronically. As such, at the time, there were no available region-wide solutions that could move forward within that environment. The HITECH Act was the impetus needed for healthcare employers regionally and nationwide to plan for the digitization of their industry.

Joint Venture: Silicon Valley Network brings together established and emerging leaders—from business, government, academia, labor and the broader community—to spotlight issues and work toward innovative solutions

Although it has been reported nationally that Health IT will drive the creation of 40,000 new jobs, it is not clear locally where or what those jobs will be. Results of the NOVA Healthcare Workforce Study (December 2010) showed that healthcare employers would not hire substantially for new Health IT roles. Rather, they will require that all clinical staff be versed in technology, specifically health information technology; development of Health IT skills will be critical for current and future healthcare workers. Entry into a healthcare job is very challenging as employers require significant experience and rely heavily on insider knowledge of healthcare culture. **This alters the healthcare workforce rather than indicating a cluster around Health IT.** Furthermore, large Silicon Valley IT employers report some reluctance to fully invest in Health IT at a larger scale until standards are more clearly established.

On a national level, FHIT Agenda seeks to "improve health and healthcare for all Americans through the use of information and technology" by creating a "health system that uses information to empower individuals and to improve the health of the population." This aim fits well within the spirit of the Valley by using technology to solve problems, particularly as an emphasis on individual empowerment conforms with Silicon Valley business-to-consumer product models. However, Silicon Valley's strengths may not be realized in a healthcare environment until later along FHITA's timeline (as detailed in the following figure) as the current focus is on data capture and sharing. **Silicon Valley business will play a role when FHITA calls for data integration, rapid learning, and technological advancement.**



"Medical is the largest wireless LAN growth sector." Keerti Melkote, Founder and CTO of Aruba Networks

This is not to say that Silicon Valley firms are not active in the Health IT market; however, they **currently operate as IT companies with a healthcare vertical.** Such firms as Apple, Hewlett Packard (HP) and Cisco develop networks and tools to build out healthcare infrastructure. Intel servers and Cisco routers help acute and ambulatory care centers function on a day-to-day basis. The *American Medical News* (2011) reports that 27% of primary care and specialty physicians own an iPad or similar device—a rate five times higher than the general population, based on market research.

As of yet, these activities do not indicate a cluster in Health IT, although they could **indicate an emerging cluster, given time and favorable conditions as the system moves towards personalized medicine.** A cluster would necessitate more cooperation and collaboration than is the current model. Stanford Hospital's 2011 announcement of the Corporate Partners Program—with the intent of creating a global model for patient-centered, technologically advanced healthcare in the next ten years—further foreshadows a potential future cluster in the intersections of and collaboration between healthcare and IT. Further, this could indicate progression towards more collaborative models and slow infusion of the aforementioned IT success factors—enabling Silicon Valley to be a habitat for IT innovation—into the healthcare industry.

"The healthcare industry is highly regulated and has low margins. We are all here because of a love for the mission – improving people's health." Amir Dan Rubin, President & CEO of Stanford Hospital and Clinics

Silicon Valley has a robust IT sector and a history of innovation. There are, however, many issues that will confront entrepreneurs moving into the intersection of healthcare and IT. The low margins and highly regulated healthcare environment, and medical device arenas, do not support the entrepreneurial environment normally experienced by the lean Silicon Valley start-up. In addition, there is a relatively high cost of local manufacturing and security and policy implications of working with any health-related personal information. Yet, there is a group of entrepreneurs furthering the mission of improving health through IT solutions; **they develop software, web-based, and mobile solutions around technology enabled healthcare**—in response to anticipation of consumer or healthcare demands—and predictive or personalized medicine.

These Silicon Valley entrepreneurs *leverage the international networks found here*. The diversity of the region is a major strength and provides strong connections with international markets (roughly 40% of the area's workforce was born outside of the U.S.). These networks encourage foreign investment into the area (with over 36 bridge organizations help international companies establish themselves in the San Francisco Bay Area in which Silicon Valley is located). Furthermore, the Valley's international reputation allows entrepreneurs entry to those markets.

"There is cachet in being in the Valley. Although we operate in Switzerland and roll out our products in India and Brazil, it is important to have an office in Silicon Valley. You need to be here for the connections and the conversations. The Swiss government never would have granted us funding if we didn't have an office in Palo Alto." Sonia Sousa, CEO & Founder of Spectroscape

Ahead of the FHITA curve, Silicon Valley entrepreneurs focus on "efficiencies" of healthcare delivery. These approaches meet FHITA goals two through five by lowering per capita costs, improving data security, allowing for remote patient monitoring, real-time patient and provider information-share, and predicting health events. Technology enabled healthcare supports a patient-centric view and is distinct from those Healthcare IT solutions—backbone legacy of information systems—well served by existing enterprise level companies. The IT spirit infuses these efforts as demonstrated by Health 2.0 participation in the 2011 Bay Area Maker Faire—O'Reily Media's premier event for grassroots

American innovation and resourcefulness-- and Kaiser sponsorship of a 2011 developer code-a-thon.

> "During the fourth quarter [2010], we saw tremendous uncertainty relating to FDA approvals, including the 510(k) process for medical devices, which is thought to have affected venture capitalists' outlook. Until we get more clarity as to the regulatory pathway…venture capitalists are expected to be cautious with deals." Tracy Lefteroff, global managing partner of the venture capital practice at PricewaterhouseCoopers.

Although interested, Silicon Valley capital is not yet heavily investing in these solutions. Significant policy barriers are surfacing around how electronic health records and medical software or algorithmic predictors might be classified as medical devices instead of IT. HealthTech Capital, a Silicon Valley group of private investors combining venture capital and angel models, invests in "capital efficient companies and business models." This includes solutions that have minimal or no Food and Drug Administration(FDA) and/or CMS oversight. Nearly every device, which is used in processes to treat or diagnose diseases or conditions, is overseen by the FDA (including such items as tongue depressors). For class III devices—those considered the most risky to human health—this oversight requires premarket approval including a prescribed process of clinical data submission to support claims made for the device. Uncertainty about standards or a delay in establishing standards would limit growth of firms working in this area. The **emergence of a Silicon Valley Health IT cluster would depend on long-standing IT traditions like lean-to-market scenarios** and releases of beta products; the requirements to engage in **years of data gathering for government approval would not permit a flurry of new health-related information technology ideas from entrepreneurs.**

Any regulations that would classify these solutions as medical devices, requiring FDA approval or hindering the acceleration of establishing standards, would significantly stifle investment. It could extinguish their Silicon Valley entrepreneurial spirit, initially ignited over 70 years ago by Bill Hewlett and Dave Packard. *A garage is no place for FDA review.*

IV: Health IT Cluster Findings

The findings of this report can broadly be described as *systemic or specific*. In terms of the systemic issues faced by companies and institutions working within the interface between the Healthcare and Information Technology industries, it is helpful to return to the factors identified as essential to Silicon Valley's successful entrepreneurial habitat. Such **success factors** included the following:

- Easy access to venture capital and other specialized business supports for innovation (e.g. intellectual property lawyers, talent recruiters)
- Large amount of new information technology ideas from entrepreneurs, universities and labs
- High-quality and mobile workforce with networks reaching all over the world
- Results-oriented environment where talent and ideas rule (regardless of national origin)
- Attractive living environment
- Cultural norms of calculated risk-taking and an optimistic entrepreneurial spirit
- Open business environment—commonly sharing non-privileged information
- Cross-sector collaboration.

Systemic Findings

A nascent Health IT cluster lacks some of those Silicon Valley success factors, namely a specialized business infrastructure, a climate rewarding risk-taking, an environment where universities and research institutes interact with industries, and cross-sector collaboration (between industries, universities and industry, and with government agencies).

Among the key elements of a specialized business infrastructure, typically available to Silicon Valley entrepreneurs, is significant venture capital or other funding —heavily dependent upon a supportive regulatory environment and investor confidence. The regulatory culture limits risk taking. For many business interests, concerns regarding low margins for some healthcare-related goods and services may also deter requisite risk taking needed to innovate.

The healthcare system is highly competitive, complex and not collaborative. There are leaders in Silicon Valley, including Kaiser Permanente and Stanford University, driving innovations in work processes and medical research but each does so without sharing. In addition, as a potentially emerging cluster, many of the institutions and networks have not been established to support greater collaboration. Collaboration between parties and sharing of best practices would greatly improve patient care and organizational effectiveness. Future changes in Health IT offer the possibility of accelerating sharing; data from direct patient outcomes will be more easily aggregated and assessed for results.

Across Silicon Valley, economic development and workforce development organizations can better collaborate when addressing the needs of would-be entrepreneurs through coordinated aims of training and business support. *Additional discussion of collaboration is included in both the sections on specific workforce and economic development findings.*

Specific Workforce Development Findings

Employment in the Silicon Valley healthcare industry is highly competitive, particularly for new entrants. Employers are reluctant to hire new graduates in the nursing and technician fields because of the challenges and expense involved in training new staff. For hospital nursing alone, the average turnover rate for first-year nurses ranges between 35 percent and 60 percent (Journal of Nursing Administration, 2008). Many healthcare employers therefore rely on experienced candidates --those with two or more years of experience-- to fill open positions. Regional education partners, like Samuel Merritt College and University of San Francisco, are piloting clinical nurse residency programs to better acculturate and prepare recent nursing graduates for the workforce. The employer-related expense of aligning and training newly graduated staff is not unique to nursing; it is nearly universal across the healthcare workforce continuum. **Better networking and increased opportunities for experiential learning (including residency programs and clinical internships)** would therefore greatly improve the quality and effectiveness of regional healthcare training graduates.

"Some of our nurses also work as adjunct faculty at local nursing schools. We pay their salary two days a week to offset a college's costs of hiring additional faculty. It's a fabulous opportunity for our experienced nurses to share their clinical knowledge with students." Jan Hunter, Director of Workforce Planning and Development at John Muir Health System

Educational programs and industry require better alignment overall to meet workforce requirements. Healthcare workforce training needs **better integration of IT into the curriculum and the practicum.** Strong clinical and technical skills will better prepare trainees, or incumbent workers, to be successful and move up the clinical ladder. This would assist many of the lower wage positions, like home health aides and medical assistants, which make up much of the growth in the healthcare labor market, to move up a healthcare career ladder.

There are potentially collaborative and innovative models that could be considered for in-classroom settings. These include increasing opportunities for industry-adjunct pools (such as that proposed by John Muir Health System), guest lecturing, train-the-trainer workshops, and industry curriculum review.

Specific Economic Development Findings

The Silicon Valley is known for innovation and there is benefit in supporting innovation as it develops. Much of workforce economy is moving toward an entrepreneur, independent contractor or consultancy-based model although there are few existing and well aligned economic development and workforce supports. Currently existing systems of workforce and economic development are not well known within the IT community at large. However, workforce and economic development systems are well positioned to convene IT sectors across major verticals and with collaboration, align workforce and educational offerings to meet the industry's ever changing needs, including transitioning from hardware to software or focusing on entrepreneurship and self-employment training or supports.

With the emergence of a newer target market (healthcare), entrepreneurs presenting IT solutions to healthcare problems are making connections with the healthcare industry but there are numerous issues that slow partnerships. One of the most important, and which appears to be missing in the healthcare/IT interface, is the glue that permits the various components to be drawn together: collaboration. As posed in the healthcare workforce model, collaboration could also be achieved through educational programs better aligning with industry, in classroom settings or social settings. Familiarity will certainly accelerate **cross-industry pollination and collaboration.** Possibilities to augment professional and networking opportunities include sponsorship of MeetUp-type groups (for individual connections), conferences, and business incubators or leveraging relationships to increase product demonstration sites and labs.

Silicon Valley companies working in the intersections of health and IT will need to be strategic about what portions of their projects are manufactured here and target products that result in higher returns. However, they face significant barriers in policy or industry standards that could impede success. **Stakeholder advocacy—through the development of policy positions against unfavorable regulation of Health IT as medical device and for acceleration of standards adoption—**will help fledgling entrepreneurs in technology enabled care and IT solutions for healthcare. Passion for the healthcare mission drives innovation; however, the industry's reputation for low margins might drive away investors and any confirmed regulation of Health IT data solutions as medical devices will certainly kill Silicon Valley-style invention and innovation. In April 2011, the House Oversight Committee held a field hearing in San Jose (CA) to gather ideas and perspective from Silicon Valley on federal regulations that constrain the growth of high-tech jobs. Included, among many on the docket who testified, are Google and Microsoft. These same policies and laws that will help the tech industry drive innovation will also facilitate innovation within intersections of healthcare and IT.

Conclusion

The Silicon Valley Team's cluster planning with local employers helped identify primarily economic development and secondarily workforce opportunities (mainly training or education) within intersections of Health and IT, where this emerging cluster touches technology-enabled healthcare. Specifically identified areas of niche growth and training opportunities include the following:

- Emerging companies in medical systems and device engineering
- Consumer electronics or applications addressing health and healthy aging
- Better integration of devices in medical practice for healthcare employers
- Training for incoming and incumbent workers in new and current devices or technologies.

This effort highlighted the need for a demand-side strategy and industry driven approach. The emergent Health IT cluster was still too undeveloped to produce demand-side requests. As such, further exploration of a cluster within the intersection of healthcare and IT should take an economic development approach. Until that cluster is more mature, a sector approach better suits the needs of workforce development. Silicon Valley Workforce Investment Boards will continue to work within healthcare and IT sectors to uncover opportunities and better connect with industries.

V: Action Plan and Recommendations

Workforce Actions

As part of a commitment to convening industries and sectors, Silicon Valley workforce investment boards (WIBs) will incorporate findings into the boards' current sector work in order to anticipate or respond to industry demands. This includes the following:

- **Convene WIB sector task forces** to continually update and expand program offerings as relevant to industry
- **Share sector projects** and findings across workforce investment areas
- **Work with educational partners** to strengthen or add IT curriculum to healthcare training
- **Pursue new training opportunities** for job seekers, including innovation or entrepreneurship preparation
- **Host future industry panels** (healthcare and IT) to foster collaboration with workforce partners

Current outreach efforts have resulted in employers becoming more familiar with existing workforce and economic development programs to support their success. As such, they are likely to partner with the Silicon Valley WIBs (NOVA, work2future, and Peninsula Works) for workforce needs as well as economic development organizations when they need support. Further, these stakeholders have expressed some interest in leveraging their expertise for our educational partners to inform training and curriculum. WIB (and partner) efforts to support this greater exchange of information between these groups will result in better leveraging of existing resources, further identification of new and emerging issues, and finally, will encourage greater mutual support through program improvements.

Recommendations

Given the level of maturation of Silicon Valley Health IT, advancing the cluster focuses on economic development. The Silicon Valley WIBS will work with a variety of partners to examine the expansion of this cluster. Among the avenues available, Silicon Valley Economic Development Alliance, as well as its parent group Joint Venture: Silicon Valley Network, offers a way to **increase collaboration** between economic development partners.

There are many institutions that are in a position to potentially buoy the emerging cluster and related sectors through fairly minor changes. **Supporting these existing institutions and creating new institutions** provides a valuable way to expand the cluster. The Silicon Valley WIBS can influence these areas directly though their ongoing efforts to provide appropriate information on the health of sectors and convening industry panels in conjunction with local

universities and colleges. Greater collaboration between the Silicon Valley WIBS themselves around shared sector projects within the regional labor market is an example of the efforts that will support existing institutions.

In some cases, new institutions may need to be established. Incubators serving specific target groups, creation of public domain sources of medical market information, or funding organizations similar to Jumpstart (a social media funding source) may be among the types of structures that could be supported in the region.

Demonstration projects or facilities are another family of institutions that can be supported. The Kaiser Garfield Center for Innovation facilitates the evaluation and adoption of new technologies and processes by the organization. The replication of this idea or encouraging development of new channels of communication, which foster incorporation of innovation, will help with the growth of this cluster.

In some cases **advocacy by stakeholders will be required** to provide the cluster with the support it requires. Stakeholders, such as Joint Venture, hospitals and industry, can develop policy positions—against regulation of Health IT as medical device or for the acceleration of standards—for use by legislative representatives or industry associations. The strong leadership of trade and business associations operating on the regional and national level will be necessary. With the support of elected officials, changes could be foreseen in the areas of medical device approval or the adoption of medical data standards. Regionally organizations such as the San Jose Silicon Valley Chamber of Commerce, Joint Venture: Silicon Valley Network and the Silicon Valley Leadership Group may be able to support WIB efforts to convene appropriate participants.

Potential Actions and Strategies for Consideration

Broad Goals:

1) *Impact training institutions for ever-evolving workforce needs*
2) *Align economic development strategies to support entrepreneurs and inventors*

***Strategy:* Better integrate IT into current healthcare training models**

Potential Partners
San Jose State University, Mission College, Ohlone College, Kaiser Permanente, John Muir Health Systems, HIMSS, CINHC, De Anza College, Stanford Hospital, Intel, Cisco Systems, IBM, Good Samaritan Hospital
Actions

• Work with educational and employer partners to discover and leverage mission critical skills needed by employers • Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners (including smaller health/IT entrepreneurs) • Explore different funding sources, such as H1-B training grants, to sponsor integration of IT into training of new and incumbent healthcare workers
Targeted Outcomes
• Better trained, more flexible and more productive, incoming and incumbent workforce with appropriate technological skill to function in a modern healthcare setting • Understanding of skills (mission critical skills needed by organizations) to ensure alignment of training and industry need • Sandbox opportunities for students to work directly with various Health IT applications and vendor products in a simulated environment

Strategy: **Create funding models to increase "in-field" or applied work experiences**

Potential Partners
San Jose State University, Mission College, Ohlone College, Kaiser Permanente, John Muir Health Systems, HIMSS, CINHC, De Anza College, Stanford Hospital, IBM, San Jose BioCenter, JobNob, SVEDA, Joint Venture, SEIU, San Mateo County Hospital Association, Council on Aging , Good Samaritan Hospital
Actions
• Work with educational and employer partners to discover and leverage funds for applied work experiences • Work with educational and employer partners to discover alternate methods of applied work experiences (including shared trainers, shared training spaces) and best practices • Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners • Explore different funding sources, such as H1-B training grants, to sponsor expansion of experiential learning opportunities for IT workers
Targeted Outcomes
• Creation of funding streams to support workforce training dollars for on the job training or internships/apprenticeships • Creation of a shared risk management pool (for insurance needs, such as workers compensation) for use by students and job seekers in on-the-job training scenarios

- Understanding of mission critical skills needed by organizations (healthcare or IT) to ensure alignment of placements
- Increase number of applied work experiences for students and job seekers
- Better integration of education and employer partners

Strategy: **Position educational institutions as assets to industry**

Potential Partners
San Jose State University, Mission College, Kaiser Permanente, John Muir Health Systems, De Anza College, Stanford Hospital, Intel, Cisco Systems, HealthTech Capital, identified entrepreneurs
Actions
• Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners • Inform educational curriculum with industry input and increase avenues for experiential learning for students or university research for employers
Targeted Outcomes
• Better trained, more flexible and more productive workforce (including culturally representative and linguistically relevant) • Pipeline opportunity for industry partners and students • Increased educational partner relevancy and integration with industry

Strategy: **Facilitate easier entry (to-market) and success for entrepreneurs**

Potential Partners
San Jose State University, Mission College, Kaiser Permanente, HIMSS, Palo Alto VA Health System, Stanford Hospital, Intel, Cisco Systems, HealthTech Capital, San Jose BioCenter, SVEDA, Joint Venture, Council on Aging, Smart Silvers, San Mateo Hospital Association, Plug and Play Tech Center
Actions
• Partners advocate for prevention of classification of software as medical devices or for acceleration of standards • Sponsor venues (such as MeetUps) to connect fellow entrepreneurs interested in business-to-consumer (b2c) or business-to-business (b2b) applications • Create or leverage education aimed at inventors and entrepreneurs such as self-employment or entrepreneurism training, social media, professional development, patent law or regulations, and marketing (including b2b and b2c)

• Facilitate commercialization of research with university partners • Connect entrepreneurs around business-to-consumer applications, such as using technology to improve quality of life for aging population, through groups, conferences and associations (like Council On Aging) • Provide information about regional partners offering entrepreneurial or workforce supports for those interested in starting a business
Targeted Outcomes
• Better trained, more flexible and more productive workforce (for inventors, entrepreneurism, contracting, and small business) • Creation of new data exchange systems through connected partners • Increased funding opportunities (grant, awards, etc) and earlier access to funding for entrepreneurs • Easier retention of the control of intellectual property rights and profit from those rights by inventor/entrepreneur • Better product targeting for entrepreneurs (including b2c) • Access to information and resources for aging population and their adult children (defining specific aging population to assist/target) for consumers and entrepreneurs • Clearinghouse of sector-specific economic development and workforce development resources

<u>Conclusion</u>

RICO outreach efforts have resulted in employers becoming more familiar with existing workforce and economic development programs to support their success. The increase in cross-sector collaboration and integration, in part an outcome of the RICO process, is imperative to future regional achievements. As such, business partners are likely to partner with the Silicon Valley WIBs for workforce needs as well as economic development organizations when they need support. This strengthens networks to leverage existing resources, further identify new and emerging issues, and, to encourage greater mutual support through program improvements.

Silicon Valley WIBs will continue to work within the healthcare and IT sectors to uncover opportunities and better connect with industries. Continued cross-sector collaboration will help infuse those factors, inherent to Silicon Valley success, into the emerging Health IT cluster. Partnerships established herein create networks of idea exchange and mutual support—feeding the Valley's entrepreneurial flame.

This growing network of partnerships will support the implementation of the above identified strategies at the right time for the emerging Silicon Valley Health IT cluster.

How We Identified Our Regional Industry Clusters of Opportunity

NOVA and work2future were initially interested in examining separate clusters of Healthcare and IT as driving forces in Silicon Valley. Based upon recommendations from Collaborative Economics, the project was focused on a merger of the two: Healthcare Information Technology (Health IT). Research and discovery drove a thoughtful process to broaden the search, while still exploring Health IT, to technology enabled care —*that* which involves the integration of technology around healthcare (i.e. software solutions, decision support, and mobile applications development).

Initial data (CA EDD, 2008) indicated the potential strength of the sector based on numbers: of the 25 largest Santa Clara County employers, 12 had IT functions or products and separately, 16 had healthcare or health related functions or products. Further fundamentals were provided by Joint Venture's 2008 health and IT sector analysis (*Smart Valley and Smart Health*) complemented with NOVA Workforce Investment Board's *2010 Healthcare Workforce Study.* The NOVA study included an in-depth review of secondary data and a primary survey of over 200 Silicon Valley healthcare employers, accompanied by 10 in-depth, executive level interviews regarding Health IT needs and the skill requirements for incoming and incumbent workers. work2future's geographic information systems (GIS) EconoVue program, using NAICS codes, allowed further understanding of the physical landscape of where companies were and where they were not. The broad classification system, as offered by NAICs codes, exposed limitations for in-depth understanding of core versus ancillary business products and roles.

Discovered data drove the broadening of the regional definition of the cluster search in order to uncover locally relevant information.

How We Engaged Employers to Develop Cluster Action Plans

The Silicon Valley Team's cluster planning with local employers helped identify primarily economic development and secondarily workforce opportunities (mainly training or education) within intersections of Health and IT, where this emerging cluster touches technology-enabled healthcare. The cluster engagement drove the discovery and inclusion of applicable niches and allowed for the exclusion of less relevant ones. Specifically identified areas of niche growth and training opportunities include the following:

- Emerging companies in medical systems and device engineering;
- Consumer electronics or applications addressing health and healthy aging;
- Better integration of devices in medical practice for healthcare employers; and,
- Need to train incoming and incumbent workers in new and current devices or technologies.

The Silicon Valley Workforce Boards will bring these items back and continue to develop them through on-going cluster or sector strategy work.

The Team reached out to more than 100 employers (as detailed in Appendix B) in healthcare, IT, health IT, and bio/medical devices to understand the needs and drivers of this space to invite them to discuss, understand the needs of, and help build a collaborative cluster action plan.

Connections with industry allowed for an expansion beyond the initial research to evaluate the cluster and cluster opportunities. Formal and informal discussions with employers on a local and national level include the following (meeting overviews are detailed in Appendix C):

- Healthcare Information and Management Systems Society (HIMSS) events
- State of California planning meetings and webinars around Health Information Exchange and Technology (including local Regional Extension Centers and Cal-eConnect, California's Health Information Exchange convener)
- Group collaborative interested in exploring Health and IT intersections
- On-site tour of the Kaiser Garfield Innovation Center to better understand how innovation is spread across a large (and locally based) health system

At all these touchpoints, the Team not only gathered data but also outreached for participants to join in our planning process.

Three stakeholders' meetings were held (attendance lists detailed in Appendix B) for interested parties to allow partners to share with each other and collaboratively develop strategies both in Santa Clara and San Mateo counties. During the stakeholders' meetings (and during subsequent discussions with employers), participants identified and agreed upon opportunities for cluster growth, as well as the economic and workforce requirements to capitalize on those growth opportunities.

The Silicon Valley Team has agreed to continue to reach out to stakeholders for insight and potential collaboration as work continues. Key strategies and ideal outcomes identified include the following:

Broad Goals:

1) *Impact training institutions for ever-evolving workforce needs*

2) *Align economic development strategies to support entrepreneurs and inventors*

Strategy: **Better integrate IT into current healthcare training models**

Potential Partners
San Jose State University, Mission College, Ohlone College, Kaiser Permanente,

John Muir Health Systems, HIMSS, CINHC, De Anza College, Stanford Hospital, Intel, Cisco Systems, IBM, Good Samaritan Hospital
Actions
• Work with educational and employer partners to discover and leverage mission critical skills needed by employers • Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners (including smaller health/IT entrepreneurs) • Explore different funding sources, such as H1-B training grants, to sponsor integration of IT into training of new and incumbent healthcare workers
Targeted Outcomes
• Better trained, more flexible and more productive, incoming and incumbent workforce with appropriate technological skill to function in a modern healthcare setting • Understanding of skills (mission critical skills needed by organizations) to ensure alignment of training and industry need • Sandbox opportunities for students to work directly with various Health IT applications and vendor products in a simulated environment

Strategy: **Create funding models to increase "in-field" or applied work experiences**

Potential Partners
San Jose State University, Mission College, Ohlone College, Kaiser Permanente, John Muir Health Systems, HIMSS, CINHC, De Anza College, Stanford Hospital, IBM, San Jose BioCenter, JobNob, SVEDA, Joint Venture, SEIU, San Mateo County Hospital Association, Council on Aging , Good Samaritan Hospital
Actions
• Work with educational and employer partners to discover and leverage funds for applied work experiences • Work with educational and employer partners to discover alternate methods of applied work experiences (including shared trainers, shared training spaces) and best practices • Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners • Explore different funding sources, such as H1-B training grants, to sponsor expansion of experiential learning opportunities for IT workers
Targeted Outcomes
• Creation of funding streams to support workforce training dollars for on

the job training or internships/apprenticeships • Creation of a shared risk management pool (for insurance needs, such as workers compensation) for use by students and job seekers in on-the-job training scenarios • Understanding of mission critical skills needed by organizations (healthcare or IT) to ensure alignment of placements • Increase number of applied work experiences for students and job seekers • Better integration of education and employer partners

Strategy: **Position educational institutions as assets to industry**

Potential Partners
San Jose State University, Mission College, Kaiser Permanente, John Muir Health Systems, De Anza College, Stanford Hospital, Intel, Cisco Systems, HealthTech Capital, identified entrepreneurs
Actions
• Better integrate RICO employers into current systems of advisory (or teaching) roles for community college and university partners • Inform educational curriculum with industry input and increase avenues for experiential learning for students or university research for employers
Targeted Outcomes
• Better trained, more flexible and more productive workforce (including culturally representative and linguistically relevant) • Pipeline opportunity for industry partners and students • Increased educational partner relevancy and integration with industry

Strategy: **Facilitate easier entry (to-market) and success for entrepreneurs**

Potential Partners
San Jose State University, Mission College, Kaiser Permanente, HIMSS, Palo Alto VA Health System, Stanford Hospital, Intel, Cisco Systems, HealthTech Capital, San Jose BioCenter, SVEDA, Joint Venture, Council on Aging, Smart Silvers, San Mateo Hospital Association, Plug and Play Tech Center
Actions
• Partners advocate for prevention of classification of software as medical devices or for acceleration of standards • Sponsor venues (such as MeetUps) to connect fellow entrepreneurs interested in business-to-consumer (b2c) or business-to-business (b2b) applications

• Create or leverage education aimed at inventors and entrepreneurs such as self-employment or entrepreneurism training, social media, professional development, patent law or regulations, and marketing (including b2b and b2c) • Facilitate commercialization of research with university partners • Connect entrepreneurs around business-to-consumer applications, such as using technology to improve quality of life for aging population, through groups, conferences and associations (like Council On Aging) • Provide information about regional partners offering entrepreneurial or workforce supports for those interested in starting a business
Targeted Outcomes
• Better trained, more flexible and more productive workforce (for inventors, entrepreneurism, contracting, and small business) • Creation of new data exchange systems through connected partners • Increased funding opportunities (grant, awards, etc) and earlier access to funding for entrepreneurs • Easier retention of the control of intellectual property rights and profit from those rights by inventor/entrepreneur • Better product targeting for entrepreneurs (including b2c) • Access to information and resources for aging population and their adult children (defining specific aging population to assist/target) for consumers and entrepreneurs • Clearinghouse of sector-specific economic development and workforce development resources

How We Are Leveraging Implementation Resources and Commitments

The Silicon Valley RICO Team leveraged American Recovery and Reinvestment Act (ARRA) funds for the initial study of the healthcare workforce and Health IT implications. Peninsula Works WIB, a partner in this process, also used ARRA funds for a recently completed assessment of healthcare and Health IT workforce for San Mateo County. Other efforts in research and study into the Health IT sector informed this endeavor. This included work completed by California Community Colleges in the San Francisco Bay Area and a RICO colleague, San Diego Workforce Partnership. Additionally, NOVA's ARRA funds, used to examine the Information Communication Technology sector, influenced findings, particularly around entrepreneurial activity at points of intersection between ICT and Health IT. The total amount of funding leveraged exceeded $500,000.

The Silicon Valley Team is using findings from this study to search for other funding to implement identified strategies, including a potential $5 Million H-1B Training Grant to address the broad goals integrating IT into curriculum for the

healthcare workforce by training of new and incumbent workers and exploring ways to expand opportunities for experiential learning for IT workers.

Further, the Team has been able to leverage *findings* by sharing information gathered with educational partners and job seekers in real-time. NOVA held a Healthcare Careers Forum (and had panel of industry experts) to share key lessons learned in this study with over 140 Bay Area educational and workforce development professionals. Information provided was later shared with numerous job seeker clients. The Team has since held follow up presentations for Job Corps/CCOC interested in healthcare careers and Health IT. NOVA team advises and collaborates with RICO stakeholder, Mission College/HWI regarding content of a currently piloting Health IT training program (funded by a separate Health IT grant) to help prepare job seekers and incumbent workers for careers in Health IT.The first cohort (30) of students completed their first semester of a 6-month program; the second cohort (30) started in January and the third cohort (30) started in April 2011.

How We Are Achieving Sustainable Systems Change

This planning grant has resulted in progress in several areas that will support sustainable systems change:

- Exploration and clarification of cluster issues
- Identification of key strategies, outcomes and partners
- Improvement of connection between the workforce participants and industry cluster representatives
- Ongoing WIB cluster-driven work

As discussed in the previous section, the local WIBs (NOVA, work2future, and Peninsula Works) have convened regional partners representing a range of RICO targets and have identified several issues faced by the industries represented by the emerging cluster. The Silicon Valley Workforce Boards will bring these items back and continue to develop them through on-going cluster strategy work. The strategies to address these issues, as selected by the stakeholders, are

- Better integrate IT into current healthcare training models
- Create funding models to increase in-field/applied work experiences
- Positioning educational institutions as assets to industry
- Facilitate easier entry (to-market) and success for entrepreneurs

Working with stakeholders, the Silicon Valley Team is brainstorming industry relevant solutions to the needs identified—such as leveraging partner relationships, shared virtual simulation labs for training, and creating product demonstration groups, among others—and will jointly look for ways to implement solutions. The process uncovered new opportunities for engaging employers directly in educational systems; such examples were team-teaching approaches

and increasing the amount of technology-based and Health IT training directly into healthcare workforce training.

Specific actions to address the issues identified broadly fall into those which 1) increase communication within the cluster; 2) support existing and new institutions; and, 3) bolster advocacy by stakeholders on larger issues (further examined in the full report as Action Plan and Recommendations).

Increase Communications
Outreach efforts have resulted in employers becoming more familiar with existing WIB and economic development programs to support their success. As such, they are likely to partner with the local WIBs (NOVA, work2future, and Peninsula Works) for workforce needs as well as economic development organizations when they need support. Further, these stakeholders have expressed some interest in leveraging their expertise for our educational partners to inform training and curriculum.

While the RICO process encouraged specific connections through the creation of a new advisory body, it is clear that there is a number of regional formal and informal institutions are also independently evolving. MeetUp and other social media sites are fostering improved exchanges between entrepreneurs, supportive organizations, funders, and end users.

WIB (and partner) efforts to support this greater exchange of information between these groups will result in better leveraging of existing resources; further identification of new and emerging issues; and finally, will encourage greater mutual support through program improvements

Support Existing and New Institutions
The discussion process has already revealed that there are many institutions that are in a position to provide additional support to this cluster through fairly minor changes. Some examples of this would be revisions to college coursework to incorporate entrepreneurship training as a component to a wider education or through supplemental certificate programs; or experiential courses which will provide students with more concrete applications of their training.

In some cases, new institutions may need to be established. Incubators serving specific target groups, creation of public domain sources of medical market information, or funding organizations similar to Jumpstart (a social media funding source) may be among the types of structures which could be supported in the region.

Bolster Advocacy by Stakeholders
The Silicon Valley Team has identified policy specific issues around device

classifications that hinder new business growth, including Health IT classification and production of standards. In some cases advocacy by stakeholders, such as Kaiser Permanente, Stanford's BioX group, or Joint Venture, will be required to provide the Regional Industry Cluster with the support it requires. The strong leadership of trade and business associations operating on the regional and national level will be necessary. With the support of elected officials, changes could be foreseen in the areas of medical device approval or the adoption of medical data standards. Regionally organizations such as the San Jose Silicon Valley Chamber of Commerce, Joint Venture: Silicon Valley Network and the Silicon Valley Leadership Group may be able to support WIB efforts to convene appropriate participants.

Company/Org.	Specialty	Contact Name	Title
Access	Software	Kiffer Davis	Marketing/Accts Manager
Acesis	Software	Stephanie Schweighofer-Jones	Marketing Manager
Agilent	Goverment Affairs	Steve Beitler	Silicon Valley Gov't. & Public Affairs
Agilent	Producers	Gustavo "Gus" Salem	vice president and general manager, Biological Systems Division
Agilent	Producers	Marie Oh Huber	vice president, deputy general counsel
AT&T	IT	Jerry Reed	Project Manager, AT&T Wireless
Bay Bio Institute	BioTech	Rob Gamble*	Consultant, formerly of Bay Bio
Kaiser Permanente	Life Sciences	Mark Metzler*	BioMedical Engineer
Bio2Device Group	Life Sciences (workers)	Harry Wachob*	President
Boston Scientific	Product Development	Corine Augustine	VP, Operations
Brain Resource Ltd	Product Development	Melissa Karr	Vice President, Marketing
CA	IT	Roger Pilc	VP & GM (eHealth Performance Manager)
Catholic Healthcare West	HC Provider	Linda Bell	ICU Nurse/Coordinator
Center for Medical Technology Policy	Policy	Penny Mohr, MA	VP of Programs
CINHC	NonProfit	Nikki West	Centralized Placement Coordinator
Cisco	Telepresence and other Health/IT	Donna Wright*	Government Affairs Coordinator
Cisco (Cisco Cerner Clinic)	HC Provider (Corporate)	Bill Updyke	Director of Cerner Clinic (onsite at Cisco)
Citrix	IT	Morgan Gerhart	Sr. Manager, Products at Citrix Networking and Cloud Group
Claremont Creek Ventures	Venture Capital	John Steuart	Managing Director
Complete Genomics	Software	Ken Prokuski	Operations
Coraid	IT	Josh Leslie	Vice President Channels and Business Development
Coronis Medical Ventures, LLC	Venture Capital	Carl Simpson	Managing Director
Crescent BioMedical	Consulting, Development	Borzu Sohrab	Principle and Founder

Company/Org.	Specialty	Contact Name	Title
Dak Systems Consulting	EMR	Deborah Kohn	principal
De Novo Ventures	Venture Capital	Jay Watkins	Managing Director
Design Your Direction	HR/Career development - Medical device background	Marianne Adoradio*	principal
EBR Systems	Product Development	N. Parker Willis	Vice President
EBR Systems	Product Development	Bob Fowler	Engineer
El Camino Hospital	Provider	David Katz	Director, Ambulatory Technology Group
EMC	IT	Chris Preston	Sr. Product Marketing Manager, Content Management (Documentum)
EPIC	IT/EMR	Judy Faulkner	Founder & CEO
FIO Technology	Software	Itsuro Yoshimoto*	Founder/CEO
Genomic Health	Software	Tricia Tomlinson	HR
HealthTech Capital	Venture Capital	Don Ross*	Angel Investor, co-founder
Hospital Consortium of SMC	consumer	Francine Serafin-Dickson	Executive Director
HP	IT	Chris Mertens	VP of HP personal systems group healthcare business
IBM	IT	Lennart Frantzell	Sr. Consultant, IBM Healthcare
IBM	IT	Amy David	VP, Software/ Healthcare (West Region)
Intel	IT	Ben Foss	Digital Health Product Development Manager
Intel	IT	Ben Wilson	Director of Healthcare IT for Intel's Digital Health Group
Intel	IT	Nancy Kamei	Sector Director at Digital Health/Intel Capital (Healthcare@Intel)
Intel	IT	Selena Chan	Principal Engineer (Intel Reader)
Intesync LLC	IT	Thomas Wong	CEO
Intuit	Software	Chris Galy	Director of Recruiting
Intuit	Software	Stephanie Fenton	Intuit Healthcare
John Muir Health	HC Provider	Jan Hunter	Director of Workforce Development
Joint Venture	NonProfit	Kara Gross*	VP
Kaiser	HC Provider	Laura Long	Workforce Planning Consultant

Company/Org.	Specialty	Contact Name	Title
Kaiser	Consumer/producer	Kathy Ricossa*	Director of Education
Kaiser	HC Provider	Ron Li	HR Area Recruitment Manager
Kaiser	HC Provider	Sean Chai	IT Director, Garfield Center for Innovation
Kaiser	HC Provider	Beverly Seifert	Former Area Technology Director
Kosmix	Web - Healthcare	Sabrina Ellis	VP Products
Lexmark (Perceptive Software)	IT/EMR	Adam Meloan	Program Marketing Manager (Healthcare)
Lifescan	Product/IT	Alice Orth	Study Coordinator
Lifescan	IT	Nancy Noe	Gov Relations
LPCH	Med. Product development/ Research	Dr. Sanjeev Dutta	Associate Professor, Pediatric Sx (and MISTRAL project co-lead)
LPCH	HC Provider	Dr. Bruce Beckingham	Pediatric Endocrinology (Diabetes I)
Lumetra (L-REC)	IT/EMR	S. Bre Jackson	Vice President of Healthcare Services
Lumetra (L-REC)	IT/EMR	Kent Waldsmith	Project Manager
MACSA	HC Provider	Laura Beeson	Director of Health & Senior Services
Mayview Community Health Center	HC Provider	Shamima Hasan	CEO
McKesson	IT	Joey Nord	Communications Director
MCkesson/Relay Health	Product/IT	Bob Katter	VP Development
MCkesson/Relay Health	Product/IT	Arien Malec	Sr. Director of Product Development
MCkesson/Relay Health	Product/IT	Andrea Sim	Product Management
MCkesson/Relay Health	Product/IT	David Murphy	Product Strategy & Marketing
Medgle	Software	Ash Damle	Founder & CEO
Medicity	IT/EMR	Lillian Myers	Marketing Senior Vice President
MedPlexus (now GE Healthcare)	Software	Chittaranjan Mallipeddi	CEO
Microsoft	IT	Nancy Narraway	Sr. Marketing Manager
Mission College	Health IT Education	Christina Oborn	Director
Mohr, Davidson Ventures	VC	Stolle	General Partner
My MedFax, Inc.	Provider	Geetha Rao*	CEO

Company/Org.	Specialty	Contact Name	Title
NextGen Healthcare	IT/EMR	Mischelle Denison	RAMP Manager
NextGen Healthcare	IT/EMR	Michael Boucher	Development Program Manager (HIS)
Ohlone College	Education	Josie Sette	Director, California Applied Biotechnology Center
Oracle HGSBU	IT	Erika Webb	User Experience Manager (Remote Data Capture)
Oracle HGSBU	IT	Madhuri Kolhatkar	Director of Oracle's Applications Unlimited User Experience
Oracle Workforce Development Program	IT (Virtual Labs)	Asim Tareen	Sr. Program Manager
Pacific Biosciences	Instruments	Mary Corbett	HR
Pacific Biosciences of CA	Instruments	Martha Trela	Vice president, marketing
Palo Alto Medical Foundation	consumer/producer	Dr. Hugo Yang	MD
Pelesend	Software	Marc Bandt	President & CEO
Pharmacyclics, Inc	Pharma	CEO is Bob Duggan	CEO
Practice Fusion	Software	Lauren Burris	HR Manager
Predictive Medical Technologies	Diagnostics/software	Bryan Hughes*	CTO
Quantros	IT	Randy Everett	HR/Operations
RIM	IT	Daniel Cheng	Software Engineer
RIM	IT	Bhavuk Kaul	Platform Product Management (Wireless)
Rotamobility	Medical/Device	Michael Bayne	Manager
SalesForce	IT	Eric Baird	Sales Engineer
San Jose Chamber of Commerce	NonProfit	Pat Sausedo	VP for Public Policy & Communications
Santa Cruz County Hospital	HC Provider	Poki Stewart Namkung	Santa Cruz County Health Officer
SAP	IT	R. Chris Christy	Business Objects, Global Healthcare Market Director
SCC Dept Public Health	HC Provider	Quamrun Eldridge	Interim MPCAH Director (Maternal/Child Health)
SCC VMC	HR	Dave Manson	Hospital HR Director
SCC VMC	HC Provider	Dennis Kotecki	VMC CIO
SCC VMC	IT	Michal Sadoff	IS Manager

Company/Org.	Specialty	Contact Name	Title
Sequoiah Healthcare DIstrict	HC Provider	Lee Michelson	CEO
SJSU	Education	Daryl Canham*	Nursing Professor and Coordinator of Nurse Managed Center
SJSU Research Foundation	NonProfit	Jeff Gordon*	Sr. Director, Program/Development
Smart Silvers	NonProfit	Susan Ayers Walker*	Managing Director
SMC Health Systems	HC Provider	Jean Fraser	Health Systems Chief
SMC Medical Center	HC Provider	Sandra Kissoon	Deputy Director of Long-Term Care and Chief Nursing Officer
Spectroscape	Product Development	Sonia Sousa	Founder and CEO
SRI International	Med. Product development/ Research	Pablo E. Garcia	Principle Engineer (Medical Robotics) and MISTRAL project lead
SRI International	Med. Product development	Alice Resnick	corporate and marketing communications
Stanford BioX Group	Education/Research	Julia Fox	Development Director
Stanford Clinics	HC Provider	Sharon Keating-Beauregard	Community Partnerships at Stanford Hospital & Clinics
Stanford Clinics	HC Provider	Kimberley Caswell	Pediatric Endo Nurse
Stanford Clinics	HC Provider	Kari S	Pediatric Endo Nurse
Stanford Clinics	HC Provider	Jen Block	Pediatric Endo Nurse
Stanford Graduate School of Business	Education	Stefanos Zenios	Professor in interdisciplinary biodesign class
Strand Life Sciences	Product Development	Thon de Boer	Director of Product Management, Software (BioInformatics; Avadis NGS product w Agilent)
StratBiz	IT	Srikanth Puran*	Managing Partner
Tethys BioScience	Product Development	Pat Arensdorf	VP, Administration (Cardiovascular DDx)
Tethys BioScience	Product Development	Ted Terasow	VP Product Development & Operations
Triple Ring Technologies	Software	Geetha Rao *	Vice president, strategy and risk management
UCSF	Education	Janet Coffman	Professor, Family and Community Medicine
VA	HC Provider	David Jaffe	Researcher & Stanford Professor
VA	HC Provider	Mary Cox	Palo Alto Lab Manager

*indicates involved stakeholder

Company/Org.	Specialty	Contact Name	Title
Varian	bio/med	Wendy Reitherman	HR
Ventus Medical	Product Development	Rajiv Doshi	Founder
VMWare	IT	Timothy Stephan	senior director, product marketing (vSphere)
VytronUS, Inc.	Product Development	Hira Thapliyal	Pres & CEO
WHHS	Provider	Lori Holdridge	Assistant CIO
Yahoo!	IT	Michael Yang	Director of Y! Real Estate, Autos and Health

2010-2011 Meeting Timeline

April 28: CWIB RICOG Participants RICO Kick Off Session

September 10: Health Trust Conference Addressing Health Reform Law and Implications and Santa Clara University

September 17: Cal eConnect Board Meeting

October 1: California Senate Select Committee on BioTechnology and Workforce Issues at Ohlone College

October 15: San Mateo County Healthcare Workforce Stakeholders Meeting

October 18: 1st Silicon Valley RICO Stakeholder Meeting, lead by Collaborative Economics

October 18: FountainBlue Networking Sessions: Intersections of Software and Healthcare at UCSC Silicon Valley Extension

October 21-22: CWIB RICOG Participants Review Session

November 3-4: HIMSS Virtual Webconference & Exposition

November 5-7: National SOPHE Conference in Denver, CO

November 17: UC Berkeley School of Public Health Social Media and Healthcare Executive Breakfast

November 18: San Mateo County Healthcare Workforce Stakeholders Roundtable

November 30: Community College Health IT Webinar

December 9: NOVA Healthcare Workforce Forum

December 10: OSHPD & CWIB Health Workforce Development Council

December 23: CalHIPSO eHealth Webinar

January 11: Stanford School of Medicine Breakfast Briefings

January 11: Stanford BioDesign Forum for Design Thinking and Applied Ideation for Assistive Technologies

January 12: Palo Alto VA Healthcare Workforce Panel

January 19: Stanford School of Medicine Health Policy Forum

January 26: CalHIPSO Nationwide Health Information Network Exchange Specifications Information Session Webinar

January 27: Silicon Valley HIMSS HIT Landscape at Aruba Networks

January 31: FountainBlue Life Science Technology Networking Session

February 9: Stanford Technology Ventures Program Entrepreneurial Thought Leaders Seminar

February 15: 2nd Silicon Valley RICO Stakeholders Meeting

February 20-25: National HIMSS Conference in Orlando, FL

March 1: Stanford BioDesign Innovator's Workbench

March 3: CWIB RICOG Participants Review Session

March 4: BizJournal Healthcare CEO Breakfast Briefing

March 17: Garfield Center Visit

March 30: UC Berkeley School of Public Health New Media Training and Healthcare

March 31: The 4Cs of Global Healthcare Reform (IBM Healthcare Teleconference)

April 12: Cal eConnect Stakeholders Planning Session at Sierra Health Foundation

April 18: Mission College Health Occupations Advisory Board

April 25: Foundation Center's New Media for Health & Human Service Organizations Training

May 12: 3rd Silicon Valley RICO Team Stakeholders Review Session

May 19: NOVA BioTech Workforce Employment Trends Panel

June 16: CWIB RICOG Participants Review and Wrap Up Session

Group or Organization Inventory

Cal eConnect
Cal eConnect, Inc., is nonprofit California public benefit corporation designated by the State of California to lead a collaborative process for ensuring the meaningful use of electronic health information exchange (HIE) in California.

California Health Information Partnership and Services Organization
CalHIPSO is an organization founded by clinical providers, for clinical providers, to help them successfully navigate through the complicated world of electronic health records (EHR) implementation.

California Workforce Investment Board (CWIB)
The Board assists the Governor in setting and guiding policy in the area of workforce development. All members of the Board are appointed by the Governor and represent the many facets of workforce development - business, labor, public education, higher education, economic development, youth activities, employment and training, as well as the Legislature.

FountainBlue
FountainBlue supports collaborative innovation, one conversation, one leader, one organization at a time through our monthly events, our dynamic communities, our consulting services for early-stage CEOs, for corporations, and for board-bound executives.

The Health Trust
Charitable foundation trying to make to make Silicon Valley the healthiest region in America—a place where every resident can achieve optimal health throughout their lifetime, no matter their background, income, race, ethnicity or age.

HIMSS (Healthcare Information and Management Systems Society)
US not-for-profit organization dedicated to promoting a better understanding of health care information and management systems, with national and local chapters.

Kaiser Garfield Innovation Center
Kaiser Permanente's living laboratory where ideas are tested and solutions are developed in a hands-on, mocked-up clinical environment.

Office of Statewide Health Planning and Development (**OSHPD**)
Housed within the California Health and Human Services Agency, OSHPD administers programs which endeavor to implement the vision of "Equitable Healthcare Accessibility for California."

SDForum
Bay Area non-profit organization devoted to informing, educating and connecting entrepreneurs and business professionals in the field of technology.

Silicon Valley / San Jose Business Journal (BizJournal)
Leading business periodical producing the latest breaking business news and features pertinent to Silicon Valley and San Francisco Bay Area businesses.

SOPHE (Society of Public Health Education)
An independent, international professional association made up of a diverse membership of health education professionals and students promoting healthy behaviors, healthy communities, and healthy environments through membership, network of local chapters, and numerous partnerships with other organizations.

Stanford BioX & BioDesign
Part of the university-wide Bio-X community, a broad collaboration between faculty and students at Stanford who share a vision for technology innovation in biomedical engineering. Includes faculty and students from over 40 departments across the Schools of Business, Engineering, Humanities & Sciences, Law and Medicine.

Stanford School of Medicine
Stanford University School of Medicine is a leading medical school located at Stanford University Medical Center in Stanford, California

U.C. Berkeley School of Public Health
One of the world's preeminent centers dedicated to the promotion and protection of the health and wellbeing. The organization's mission is to conduct world-class research; apply it to improve human health; develop diverse leaders; and enhance the health workforce through continuing education and assistance.